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April 18, 2014

The Honorable Fred Upton
Chairman, Committee on Energy and Commerce
United States House of Representatives
2125 Rayburn House Office Building
Washington, DC 20515-6115

Dear Chairman Upton:

Thank you for this opportunity to provide the Committee on Energy and Commerce with information about the challenges faced by the Midcontinent Independent System Operator and its members during this winter season. MISO is committed to ensuring the reliability of the electric grid in an economically efficient manner.

The winter of 2013-2014 was characterized by historic cold throughout much of the country. Extreme cold conditions impacted the MISO Region on several occasions, with the coldest temperatures in twenty years experienced in early January. While the conditions presented challenging circumstances, MISO and its members were able to reliably manage the power grid during this period.

MISO's answers to your committee's questions will provide a sense for the challenges encountered during this past winter season and the successful management that took place. While we are certainly proud of what was accomplished this past winter, it is the 2016 and beyond period that has our full attention. The nation's changing energy landscape could reduce our ability to maintain reliability, especially in the event of an occurrence of similar conditions.

The MISO region currently enjoys a healthy 28% reserve margin, well beyond the reserve requirements (approximately 14%) established by standard planning processes. However, MISO's generation fleet is being affected by age, fuel prices and environmental regulations. These factors are driving the retirement of many power plants, which will erode reserve margins and increase reliability risk. This expectation for tighter capacity conditions led MISO to partner with our state utility regulators to obtain a more complete supply picture. The latest result of that joint effort projects a two gigawatt reserve margin shortfall during the summer of 2016 for MISO's North and Central Regions – encompassing portions of eleven states. That forecast assumes a demand level consistent with normal weather conditions. Extreme weather occurring in combination with inadequate reserves would result in an exponentially higher probability of a loss of load scenario.

Entities other than MISO, the various utilities and state regulatory authorities, make all investment decisions on retirements and new resources. MISO's role is to provide transparency on the region's resource situation, plan the transmission system to enable the delivery of resources provided and then manage the commitment and dispatch of those resources available during daily operations.

We will continue to provide transparency into the supply picture and take every opportunity to contribute to discussions among policy makers and other stakeholders. MISO appreciates the opportunity to answer your questions and would be available to further discuss this important matter with you and your committee.

Thank you for this opportunity and your committee's important work.

Sincerely,

John R. Bear
President and CEO

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Enclosures

cc: (via electronic copy)
David Bell
Patrick Currier

MISO's Response to Questions from the United States House of Representatives, Committee on Energy and Commerce, on 2014 Winter Cold Weather Events

1. For this past winter season, please address the following relating to the MISO system:

    a. Did MISO have sufficient **operating reserves** during the recent cold weather conditions?

    MISO Response: Generally, yes. Usually, operating reserve shortages occur very infrequently during the winter season. During this past winter we experienced increased periods of reserve shortages, but they were low. From December 2013 through February 2014, we had forty-two 5-minute intervals of operating reserve scarcity. Two days accounted for the vast majority of these instances.

    Twenty 5-minute intervals of operating reserve scarcity occurred on January 7, 2014, with another twelve occurring on February 11, 2014. On January 7, even though demand was 3,800 MW lower than on January 6, MISO experienced very tight supply conditions. Lower wind output, generation availability and imports contributed to the reduced supply.

    Operating reserve scarcity on February 11th was driven by high demand coupled with forced generation outages, including gas supply issues experienced by some natural gas-fired power plants.

    b. Were there generating units contracted for capacity that failed to produce power when called upon during the recent cold weather events? If yes, please describe the type of generation source for each contracted unit that failed to produce power.

    MISO Response: Yes. However, forced outages are a routine occurrence on a system of MISO's size. But during extreme weather events the frequency and magnitude of these outages increase. The following table shows the forced outages during six days of this past winter.

	Forced Outages						Values in MW
Market Date	Mechanical Failure	Failure to Start	Gas Related Issues	Total Forced Outages	Planned Outage	Derate	Total Outage and Derate
1/6/2014	12,959	367	4,410	17,736	4,437	6,658	28,830
1/7/2014	17,285	611	6,666	24,562	4,471	8,281	37,315
1/8/2014	19,813	540	3,761	24,114	4,997	8,597	37,708
2/11/2014	13,595	590	1,174	15,359	11,191	6,003	32,553
3/3/2014	17,139	674	1,121	18,934	15,170	7,011	41,116
3/4/2014	14,782	954	2,698	18,434	15,252	5,773	39,459

c. At any time did MISO rely on electricity imports from other systems in order to meet its own system energy needs, outside of normal operating conditions? If yes, please describe the magnitude and duration of such reliance, and any remedial actions.

MISO Response: No. During peak conditions on January 6th, MISO was importing from PJM. However, these imports were economically based and sufficient reserves remained in MISO. On January 7th, PJM experienced emergency conditions and MISO had sufficient resources to provide PJM with about 5,500 MW of imports to assist with their situation. This assistance was enabled by MISO's recent addition of a new South Region that has excess generation available.

d. Were there any periods of unplanned loss of load during this time? If yes, please describe the reason, scope, and duration of any unplanned loss of load.

MISO Response: No.

e. Did MISO experience any generation outages or curtailments due to lack of fuel? If yes, please describe the reason, scope, and duration of any loss of fuel.

MISO Response: Yes. Fuel-related generation outages and curtailments occurred on multiple days during the winter period. The table provided in 1b above includes the amount of generation forced offline due to gas supply issues for the days MISO manually collected such data.

f. Was MISO required to adjust generation commitment and/or dispatch due to the conditions on the natural gas system?

MISO Response: Yes. This type of outage is treated no differently than any other forced outage that MISO experiences. MISO processes committed and dispatched other resources to meet load.

2. For the MISO region this past winter season, what would have occurred in terms of reliability and affordability of electricity if coal-fired units, or other fossil fuel-fired units, or nuclear power plants that have announced retirement had not been available?

    a. How many of these retiring units ran during the recent cold weather incidents? How many megawatts did these retiring units provide?

    MISO Response: MISO currently expects 59 coal units will retire during or before 2016. The table below provides the number of those units generating during the peak load hour on several of the coldest days this winter and their output at the time of peak.

Date	Number of Retiring Coal Units Running	Output at peak hour (MW)
1/6/2014	36	3,727
1/7/2014	37	3,687
1/8/2014	35	3,291
1/22/2014	33	3,699
1/27/2014	39	4,065
1/28/2014	39	3,834
2/6/2014	32	3,285
2/11/2014	31	3,521
3/3/2014	36	3,908
3/4/2014	36	3,812

    b. Does MISO plan to replace the capacity provided by the retiring units? If the replacement is expected to be natural gas units, is deliverability of natural gas an issue of concern in the MISO footprint?

    MISO Response: Decisions on replacement of retiring units are made by the load serving entities and state regulators in our footprint. However, MISO does expect the number of natural gas units to increase in the MISO footprint.

    MISO-commissioned studies of natural gas infrastructure[1] in the region indicate that the deliverability of natural gas throughout the MISO footprint is generally sufficient to support the current gas generation infrastructure, although localized challenges do exist. MISO is working with its stakeholders, including state and federal regulators, to ensure that sufficient infrastructure is available to power expanded gas generation resources. This and other gas-electric interdependency issues are being worked on in MISO's Electric and Natural Coordination Task Force.

[1] See the Phase III Gas-Electric Infrastructure Report at https://www.misoenergy.org/WhatWeDo/StrategicInitiatives/Pages/EPACompliance.aspx.

c. Has MISO performed any economic modeling to determine how many natural gas units are likely to be built to replace retiring capacity?

MISO Response: While MISO is not responsible for making decisions regarding the addition of capacity, MISO does produce resource expansion forecasts through its annual regional transmission expansion planning (MTEP) process. Gas generation is the primary resource of choice in the majority of future scenarios modeled.

d. Does MISO expect or have any firm commitments that new natural gas units will be constructed within the MISO footprint?

MISO Response: Based on our most recent survey of load serving entities, MISO expects approximately 830 MW of natural gas-fired generation to be added to the system by 2016.

e. Is there sufficient natural gas transportation capability available in the MISO footprint for anticipated new natural gas units?

MISO Response: The results of a MISO-commissioned study of natural gas infrastructure, also referenced in the response to question 2.b. above, indicate that while many natural gas pipelines in the MISO footprint have sufficient transportation capability to serve new combined cycle units and/or combustion turbines, as well as increasing demand from existing gas-fired generators, others will require infrastructure expansion to meet the needs of new units.

3. Please describe in detail how renewable energy resources performed when dispatched during the cold weather conditions?

MISO Response: In general, renewable energy resources performed as expected during the cold weather conditions. Wind output at the time of MISO's peak load did vary significantly, but those changes were forecast in advance, allowing MISO to adjust output on other units accordingly. During the extreme cold period in early January, wind generation at the time of peak fell from approximately 6,600 MW on January 6 to 2,300 MW on January 7. Icing and cut-outs did impact wind units, but MISO was able to effectively manage the losses in the same manner as outages on other units are managed.

4. Please describe in detail how demand response resources performed during the cold weather conditions. Was demand response subject to compliance penalties?

MISO Response: MISO directed no demand reductions – including demand response and interruptible load – during the cold weather conditions. Members are able to engage in

voluntary load reduction activities and did employ a nominal amount of local demand response programs at various times during this period.

5. Please describe in detail how distributed generation performed during the cold weather conditions?

   MISO Response: MISO does not have information on how distributed generation may have performed during the cold weather conditions.

6. Please describe in detail how system conditions in neighboring Balancing Authorities affected MISO's operations during recent cold weather conditions.

   MISO Response: MISO coordinated extensively with our neighbors during the cold weather conditions. Neighboring system conditions did not significantly impact reliable operations of the MISO footprint during this timeframe. However, Tennessee Valley Authority (TVA) Transmission Loading Relief (TLR) events, due to local voltage conditions, did impact bulk electric system transfers during the recent cold weather conditions. MISO was able to provide support to neighboring entities on January 7, 2014, while they were in Energy Emergency Alert (EEA) situations.